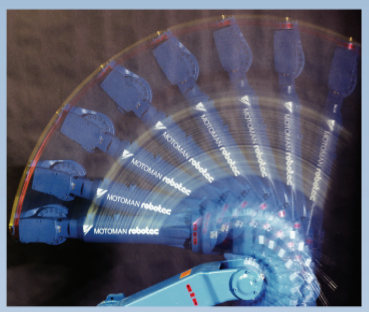

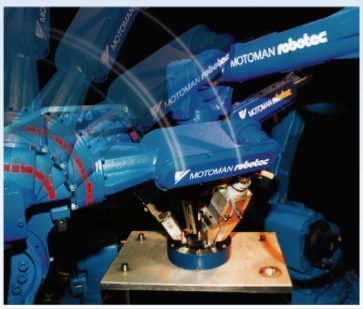

MotoAdmin

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1 Introduction

MotoAdmin is a software for controlling Motoman Yasnac XRC- und NX100 controllers from remote side.
MotoAdmin runs on Windows Pc with Windows2000/XP operating systems. Connection to robot controller is possible directly via serial interface, using com server device or Ethernet interface (recommended). The necessary hardware is not part of MotoAdmin.

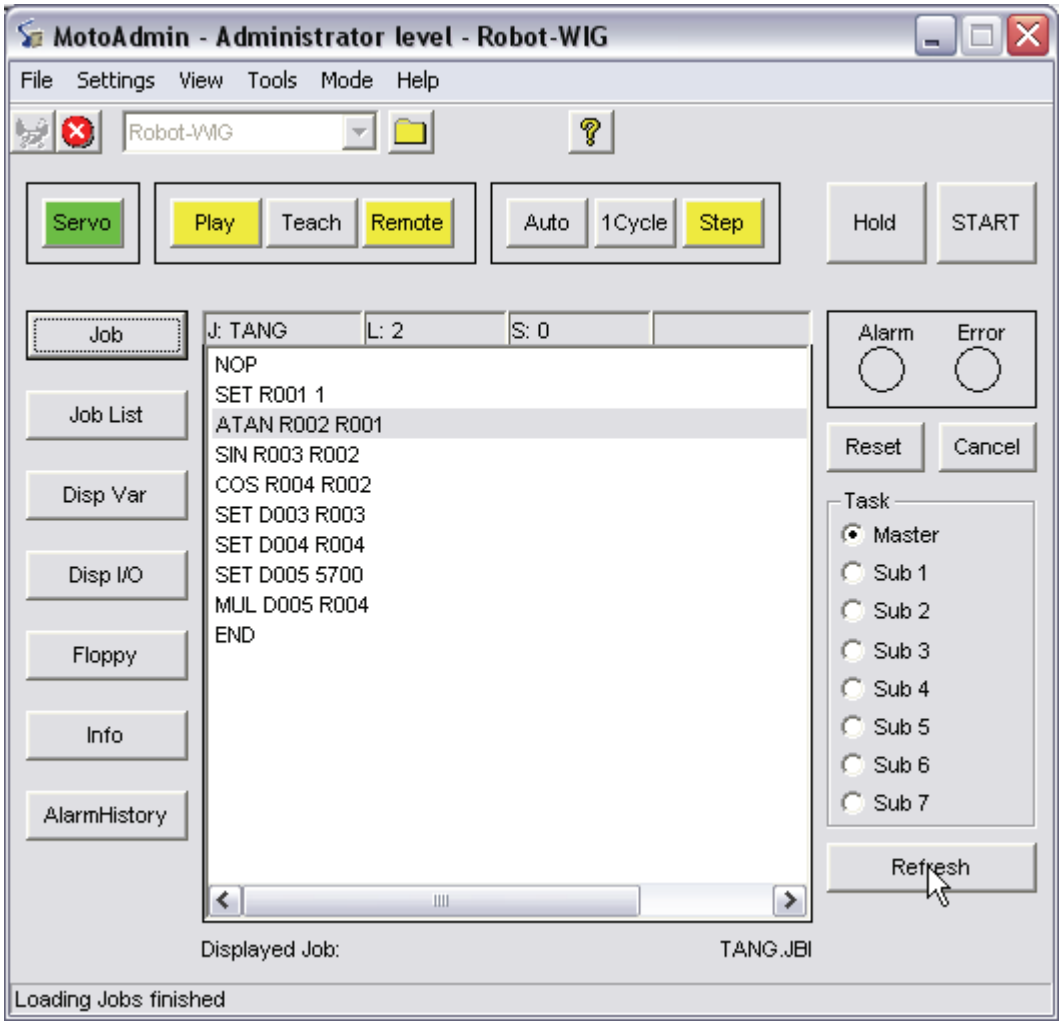

Figure 1 Main window MotoAdmin

To get the full functionality of MotoAdmin, the robot controller must run in „CommandRemote“ mode.

MotoAdmin support the following functions:

- File access, loading, saving and deleting of job files is possible. System data handling is limited.
- Backup profiles for One-Button-Backups can be used.
- Displaying and editing of global variables.
- Displaying of I/O signals (changing output signals is possible with modified ladder program).

- Controlling job execution.
- Display and also reset alarm and errors. Watch alarm history.
- Get system information like software version data, installed functions, robot types, external axis, position data.
- Edit job data (without syntax checking).

The functions are grouped into 3 different security zones. It must be considered that depending on selected security level, there are some functions which can cause danger to human and machine. Therefore it is important that only well-trained staff members are consulted to work with MotoAdmin.

MotoAdmin base package is limited to 4 robot controllers. If more robot controllers should be managed by MotoAdmin additional licences must be purchased.

2 Installation and basic configuration

2.1 Components

MotoAdmin package contains:

- ► 1 CD-ROM
- ► 1 hardware key
- ► 1 RS232 cable; robot controller (9pin) <-> pc (9pin)
- ► 1 user manual

2.2 System requirements

- ► Windows PC
  - WindowsXP/2000
  - Ethernet TCP/IP network interface or serial COM interface
  - 20 MByte free harddisk storage capacity
  - CDROM drive
- ► Robot controller XRC or NX100

2.3 Installation of MotoAdmin

Installation of hardware key should be done after software installation. Otherwise there may be some problems in case of USB hardware keys.

Before starting software installation procedure, login to windows system with local administrative rights.

Insert CDROM into CDROM drive of computer. The installation now starts automatically. If not use windows explorer, change to CDROM drive letter and run „cdstarter.exe“ directly from CDROM. After splash screen is displayed select installation of MotoAdmin.

If corresponding message appears restart your computer.

Execution of MotoAdmin is only possible, if the hardware key is attached to the parallel port (optional USB port) of your computer. Please confirm selected interface is a parallel interface and not a 25pin serial one.

2.4 Uninstallation of MotoAdmin

To uninstall MotoAdmin software open windows control panel and select Add/Remove programs.

Select MotoAdmin out of the list of installed software and click on the Uninstall button.

2.5 Connection types

Data communication between pc and robot controller for exchanging data or for remote control is possible by using different communication channels.

Serial communication

For serial communication an appropriate cable is necessary. MotoAdmin package contains such a cable which is a standard null modem cable with 9pin female connectors on both sides.

To connect robot and pc attach one end of the cable to a RS232 port of your pc, the other end of the cable connect to the serial port of robot controller. In case of XRC it is not possible to use RS232 port of Teachbox.

Ethernet communication

XRC robot controllers are not delivered with an Ethernet interface by default. Therefore to use Ethernet communication with XRC an additional extension board must be ordered. For installation of this board refer to „YASNAC XRC Ethernet I/F Board Instructions”. NX100 controllers are always equipped with an Ethernet port.

Also PC system needs to have an Ethernet interface. Connection between PC and controller is established by using standard Ethernet hardware.

2.6 Configuration of robot controller

For establishing a connection between robot controller and PC, some configuration is necessary at controller side:

2.6.1 NX100

Table 1 shows the basic settings necessary for MotoAdmin and NX100.

Parameter	Description	Possible values	RS232C	Ethernet
FD003	Computer Communication	0:disable 1:enable	1	1
FD042	Ethernet Function	0:disable 1:enable	0	1
RS000	Port Protocol	2:BSC Protocol 3:FC1 Protocol	2	2
RS006	Data Transm. Ext.	0:Disable 1:Enable	1	1
RS029	Data loading during Playback	0:disable 1:enable	1	1
RS030	Data Bits	8:8 data bits	8	
RS031	Stop Bits	0:1 stop bit	0	
RS032	Parity	2:even parity	2	
RS033	Baud Rate	8: 19200 Baud 7: 9600 Baud 6: 4800 baud 5: ……	7	
RS034	Timer A	No. in 0.1s	30	
RS035	Timer B	No. in 0.1s	200	
RS036	ENQ Retry Count	No.	10	
RS037	Data Retry Count	No.	3	
RS038	Block Check Meth.	0: Checksum	0	
RS070	IP address			192
RS071				168
RS072				100
RS073				10
RS074	Subnet mask)			255
RS075				255
RS076				255
RS077				0
RS078	Default Gateway			192
RS079				168
RS080				100
RS081				100

Table 1 Basic settings NX100

Ethernet or serial RS232

Parts of the table are marked grey. These are additional settings for Ethernet communication.
If serial communication is to be used, Ethernet function must be disabled.
If software version of robot controller supports Ethernet/http this protocol can be used instead of Ethernet/Bsc. To activate Ethernet/Http some additional configuration must be done.

Parameter	Description	Possible values	RS232C	Ethernet
FD077	Ethernet/Http Function	0:disable 1:enable	0	1

FD078	Ethernet/Http Function	0:disable 1:enable	0	1

Table 2 Ethernet/http function

Ethernet/http must also be selected during setup of robot profiles in MotoAdmin (see Figure 2).

Ethernet configuration dialog im maintenance mode

Current software versions of NX100 robot controller support Ethernet configuration in maintenance mode with special user interface. This dialog is accessible by executing the following steps:

- Start maintenance mode.

  Maintenance mode is executed, if the *MainMenu* key is pressed during power on of controller.
- Login to *Extended Mode*.

  (For TCP/IP configuration ExtendedMode is suitable. For activating Ethernet function manufacturer mode („Yaskawa Modus“) is necessary. This mode can only be accessed by Motoman service staff members.)
  Execute System=>Security=>Select mode and Insert ID.
- Configuration dialog can be accessed by executing:

  System=>Setup=>Optional Functions=>Network
  (System=>Setup=>Optional Functions=>Ethernet Detail)

Using right TCP/IP address data

The displayed TCP/IP data should be seen as an example. If PC has the address 192.168.100.11 and a subnet mask of 255.255.255.0 a communication would be possible, if proper cabeling (Hub, Switch or direct connection with crosslink cable) is assumed. Physical connection is properly established, if ping command is successful.

CommandRemote settings

To access robot controller by MotoAdmin, controller must run in host mode. Besides the basic settings there are four more parameters which influence host mode.

- CommandRemote mode:

  CommandRemote mode is activated by enabling special pseudo input signal: MainMenu=>In/Out=>Pseudo Input Signal=>Command remote selection.
- Remote Mode:

  To enable remote mode, put rotary switch on teachbox to position *Remote.*
- RS005/RS007-Parameter:

  Parameter section.

Command Remote	Remote	RS005+RS007	Available Function
X	X	1	Host All-Commands
X	X	0	Host All-Commands
X	O	1	Host Read-Only
O	X	1	Host Read-Only
O	O	1	Host Read-Only

Table 3 CommandRemote mode settings NX100

2.6.2 XRC

Table 1 shows the basic settings necessary for MotoAdmin and XRC

Parameter	Description	Possible values	RS232C	Ethernet
FD003	Computer Communication	0:disable 1:enable	1	1
FD042	Ethernet Function	0:disable 1:enable	0	1
RS000	Port Protocol	2:BSC Protocol 3:FC1 Protocol	2	2
RS006	Data Transm. Ext.	0:Disable 1:Enable	1	1
RS029	Data loading during Playback	0:disable 1:enable	1	1
RS030	Data Bits	8:8 data bits	8	
RS031	Stop Bits	0:1 stop bit	0	
RS032	Parity	2:even parity	2	
RS033	Baud Rate	8: 19200 Baud 7: 9600 Baud 6: 4800 baud 5: ……	7	
RS034	Timer A	No. in 0.1s	30	
RS035	Timer B	No. in 0.1s	200	
RS036	ENQ Retry Count	No.	10	
RS037	Data Retry Count	No.	3	
RS038	Block Check Meth.	0: Checksum	0	
RS070	IP address			192
RS071				168
RS072				100
RS073				10
RS074	Subnet mask)			255
RS075				255
RS076				255
RS077				0
RS078	Default Gateway			192
RS079				168
RS080				100
RS081				100

Table 4 Basic settings XRC

Ethernet or serial RS232

Parts of the table are marked grey. These are additional settings for Ethernet communication. If serial communication is to be used, Ethernet function must be disabled. XRC robot controllers are not delivered with an Ethernet interface by default. Therefore to use Ethernet communication with XRC an additional extension board must be ordered. For installation of this board refer to „YASNAC XRC Ethernet I/F Board Instructions". If serial communication is to be used, Ethernet function must be disabled.

Ethernet configuration dialog in maintenance mode

XRC robot controller support Ethernet configuration in maintenance mode with special user interface. This dialog is accessible by executing the following steps:

► Start maintenance mode.

Maintenance mode is executed, if the *TopMenu* key is pressed during power on of controller.

- Login to *Extended Mode*.
  (For TCP/IP configuration ExtendedMode is suitable. For activating Ethernet function manufacturer mode („Yaskawa Modus“) is necessary. This mode can only be accessed by Motoman service staff members.)
  Execute Area key=> Security=>Select mode and Insert ID.
- Configuration dialog can be accessed by executing:
  System=>Einstellungen=>Optionale Funktionen=>Ethernet Detail.

Using right TCP/IP address data

The displayed TCP/IP data should be seen as an example. If PC has the address 192.168.100.11 and a subnet mask of 255.255.255.0 a communication would be possible, if proper cabeling (Hub, Switch or direct connection with crosslink cable) is assumed. Physical connection is properly established, if ping command is successful.

CommandRemote settings

To access robot controller by MotoAdmin, controller must run in host mode. Besides the basic settings there are four more parameters which influence host mode.

- CommandRemote mode:
  CommandRemote mode is activated by enabling special pseudo input signal: Top-Menu=>In/Out=>Pseudo Input Signal=>Command remote selection.
- Remote Mode:
  To enable remote mode, hit remote key on controller cabinet.

3 Management functions in main menu

3.1 File menu

To close MotoAdmin application select *File=>Exit*.

3.2 Settings menu

Settings menu contains *Robot Setup…* menu, where robot profiles can be created, edited or removed.

3.2.1 Robot Setup...

After selecting *Robot Setup...* menu, the following dialog appears.

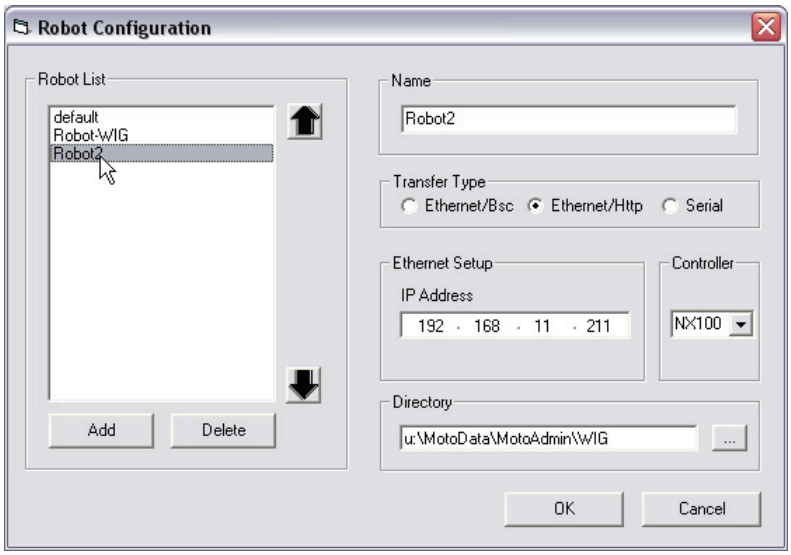

Figure 2 Robot profile

With the *Add* and *Delete* buttons robot profiles can be added or removed. For each profile a unique name must be inserted.

In the second step the transfer type must be selected. Basically Ethernet or serial communication can be used, dependent on how the robot controller is connected to the MotoAdmin PC.

In case of serial communication the parameters of serial interface must be specified. This can be done by selecting *Setup...* button. These settings must correspond with the settings on robot controller side. Refer to Figure 3 for the default (factory) settings of Yasnac controllers serial port.

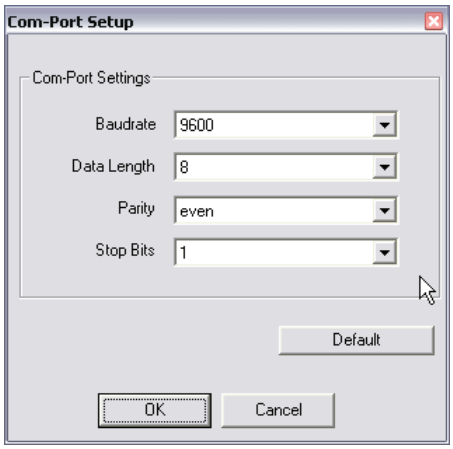

Figure 3 Com Port settings

In case of Ethernet communication the IP address of robot controller must be inserted.

In the last step controller type and a working directory must be specified. It is recommended to create a new working directory for every robot controller, because all data is stored in this directory.
E.g.
C:\Cell1\Robot1
C:\Cell1\Robot2
C:\Cell2\Robot1

All configuration data is stored in a file named *robot.ini*. So after application is closed data is still present.

The name of the currently selected robot profile can be seen in the toolbar of MotoAdmin. The list contains all available robot profiles, which are created in previous steps. To connect to another robot controller, stop current session, select desired robot profile out of the list and push the connect button again. Only one connection per time is possible in MotoAdmin. The name of the last selected profile is automatically stored in MotoAdmin.

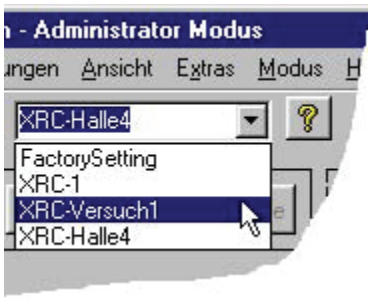

Figure 4 Selection of robot profile

3.3 View menu

Use *View* menu to enable/disable Toolbar or Statusbar.

3.4 Tools menu

3.4.1 Check connection...

The *Check connection...* menu allows to establish a test connection to the selected controller. If the connection is successful the following message is displayed.

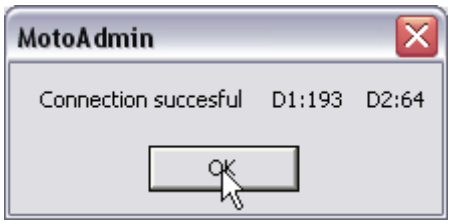

Figure 5 Check connection

After confirming the message connection is closed.

3.4.2 Select language

MotoAdmin supports multiple languages. For installing a new language an new language file (*.lng) must be created. The currently present languages file can be edited, if the structure is not changed. Language selection dialog is shown at application start by default.

Figure 6 Language selection

To prevent MotoAdmin from displaying the language selection dialog at every application start, select option *Ignore language selection at program start* on dialog. Changing language is still possible by selecting menu item *Select language…* in *Tools* menu.

3.4.3 Register licenses...

In the standard package of MotoAdmin 4 licenses are included. That means a maximum of 4 robot profiles can be created. If more robots are neccessary additional licenses are available. The dialog is neccessary to update license information. Fill in the serial number of your product and a check number, which you will get after purchasing the license fee.

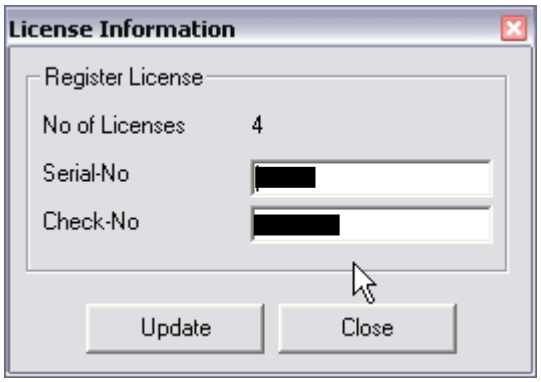

Figure 7 Register licenses

3.5 Mode menu

The current security level can be changed by selecting the *Change security level* menu item.

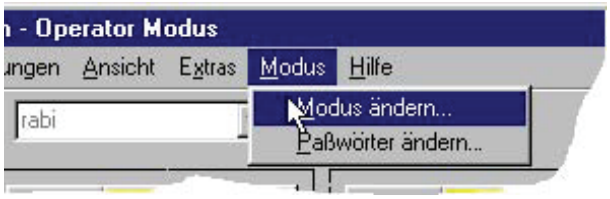

Figure 8 Mode Menu

To change to a different level select desired level and enter password.

Figure 9 Change security level

If the entered password is valid for the selected security level the level will be changed. You can see the current security level in the title bar of the main window.
Es existieren in MotoAdmin 3 Sicherheitsmodi:

► Operator Mode:

The operator is allowed to do control functions. He can connect to robots (if the robot configuration is already available), he has the rights to get status information, to read inputs and outputs, to read variables and to save robot data files. The Operator Level is the default level. So no password is needed.

- Programmer Mode:

  In addition to the functions the operator can execute, the programmer is allowed to start robot jobs and to load robot data files.

- Administrator Mode:

  The administrator is allowed to do everything which is possible in MotoAdmin.

The passwords can be changed by clicking on the *Change password* menu item. In the displayed dialog the new password must be entered twice. The new password must be entered twice.

Figure 10 Change password

To change the password your security level must be higher then the level you want to change the password. So the operator is not allowed to change a password, while the administrator can change all passwords.

Das erfolgreiche Ändern des Passworts wird mit einer entsprechenden Meldung bestätigt.

Wichtig:
The actions which can be made in operator mode are safe. But if you are logged on with higher security level keep in mind that you are able to move the robot. Do not move the robot if you cannot see the robot manipulator.
Motoman robotec GmbH is not responsible for damages caused by using MotoAdmin.

Info:
The initial passwords of administrator and programmer level are set to **motoadmin**.

3.6 Menü Hilfe

The help menu should be accessed if there are problems or questions concerning the functions of MotoAdmin.

4 Working with MotoAdmin

4.1 Starting MotoAdmin

If the default settings are used during installation of MotoAdmin you can start it as follows:

- search for group *Motoman\MotoAdmin* in MS Windows program manager
- click on *MotoAdmin*

If the language selection dialog is displayed after starting application, select desired language.

4.2 Multiple Instances of MotoAdmin

It depends on the selected connection protocol if one or multiple instances can access a robot controller at the same time. It makes no difference if these instances are running on the same or different PC's.

If the connection protocol is (siehe Figure 2) Ethernet/http, multiple instances can connect to the same robot controller. In contrast Ethernet/Bsc allows only one client.

Innerhalb einer Instanz von MotoAdmin kann gleichzeitig nur auf eine Robotersteuerung zugegriffen werden.

If you want to connect your PC to multiple robot controller at the same time you have to open multiple instances of MotoAdmin.

4.3 Establish a connection

Select one robot profile out of the list of already defined robot profiles and push corresponding toolbar button.

Figure 11 Establish connection

In the status bar a message *Connected* is displayed.

4.4 Close a connection

An active connection can be closed with the *Disconnect* button..

Figure 12 Close connection

In the status bar *Not Connected* is displayed.

4.5 Exit application

To close application select menu item *File=>Exit.*

4.6 Display working directory

In the working directory all data of the robot is stored. To display contents of working directory in a windows explorer window, push the corresponding button. The working directory can be changed in the robot profile configuration dialog (Figure 2).

Figure 13 Working directory

4.7 Refresh status

Basically the display of MotoAdmin is of static nature.

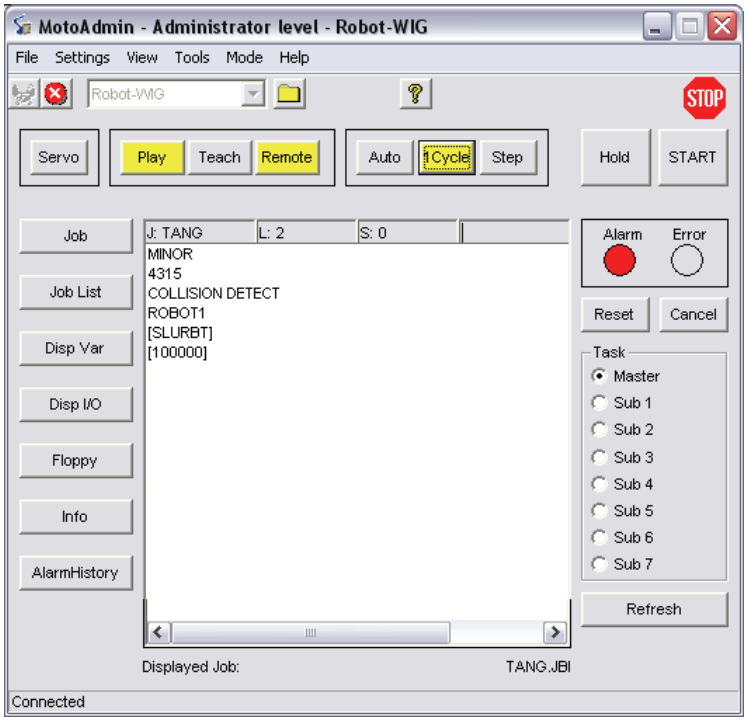

Figure 14 Status

The status of the robot is not displayed continously. So changings are not displayed automatically. But there are also some functions in MotoAdmin, which refresh the status display. To display the current status of the robot you can click on the *Refresh* button.

The status information contains error or alarm status information for example. MotoAdmin signals an alarm or an error graphically. You have to click on the *Reset* button to reset an alarm. To confirm an error you have to click the *Cancel* button.

Another status item is the Emergency Stop signal, which is displayed in the upper right corner (refer to Figure 14) of MotoAdmin.

4.8 Switch on Servo Power

If the controller is in play mode you can switch on the servo power by selecting the *Servo* button. It is necessary to have servos on before moving the robot.

A special wiring is required for starting servo power from remote.

XRC:
At XRC controller connect:pin 5 - EXVON1+ and pin 6 - EXVON1 as well as pin 7 - EXVON2+ and pin 8 – EXVON2 on XC001 board, connector CN05.

NX100:
In case of NX100 controller connect pin 29 - EXVON+ and pin 30 - EXVON- on MTX-connector block -X18 (see cabinet door).

4.9 Change operation mode

To set robot controller in teach or play mode use the *Play* or *Teach* button. Please notify that it is not possible to use each function in each operation mode..

In case of NX100 controller full functionality is only available if rotary switch at programming pendant is set to *Remote*. This mode is called Remote/Play mode. In MotoAdmin it is possible to change to Remote/Teach mode, if parameter S2C177 is et to 0.

4.10 Cycle mode

There are 3 different Cyle modes. Die Zyklus-Auswahl gestattet die Auswahl des Operationszyklus, d.h. sie legt fest, ob nach Betätigen von *Start* ein Job einmal ausgeführt wird (Cycle), permanent (Auto) bzw. ob jeweils nur ein Schritt ausgeführt wird (Step).

4.11 Job execution / Job control

With MotoAdmin a job can be started remotely. Therefore the controller must be in Play mode (see chapter 4.9) and the Servo power must be switched on (see chapter 4.8).

By pushing *Start* button the job is executed. Job execution can be stopped at each time by selecting *Hold* button. To exit job execution *Hold* button must be selcted again. With *Start* button job execution can be resumed. Different button colors show the current status of job execution.

4.12 Display Jobs

After connecting to MotoAdmin the current job of the main task is displayed. The job window is called by selecting *Job* button.

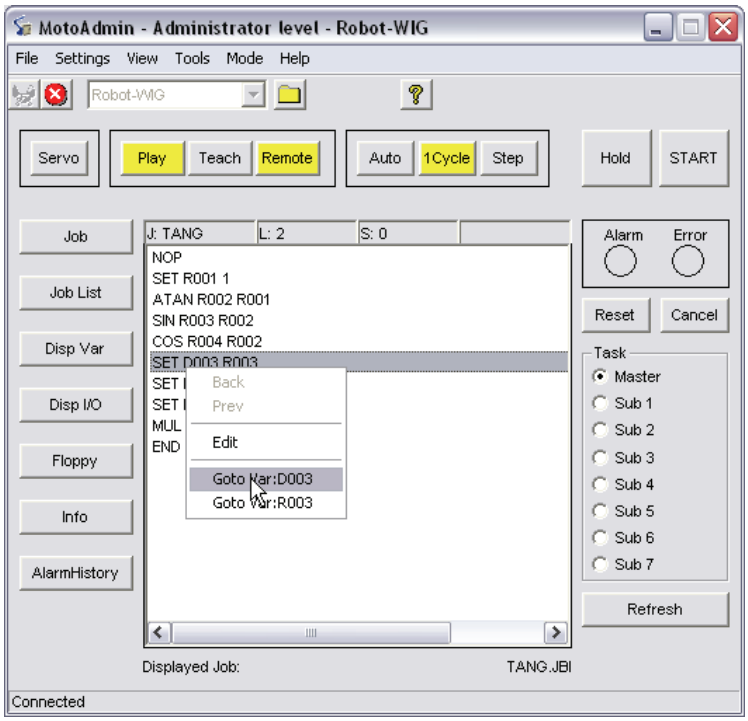

Figure 15 Job window

Task:

Dependent on the job structure there might be some jobs running in parallel SUB tasks. By selecting the desired task the corresponding job is displayed, if available.

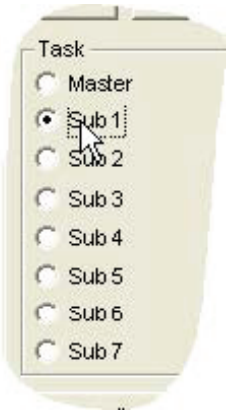

Figure 16 Multitasking task-selection

The Job button always displays the currently selected task

Job status line

The job status line shows the active job of the selected task in addition to current line and Step number.

Job window context menu

Context menu of job window is displayed by pushing right mouse button. Some of the following commands are available, dependent on the current selected job line.

Befehle	Aktion
Back	Calls previous job in job history

Next	Calls next job in job history
Edit	Opens job in job editor window
Goto Var:	Öpens displayed variable directly
Goto IN#:	Opens displayed input directly
Goto OT#:	Opens displayed output directly
Goto Job:	Open displayed job directly

Table 5 Context menu job window

Displayed job
The jobname of the currently displayed job in job window is written below the job window.

4.13 Edit Jobs

Editing job, which can be initiated by selecting menu *Edit...* in context menu of job window is done without checking syntax. Therefore it is only suitable for experienced programmers. Other less experienced programmers can use MotoAdmin for downloading/uploading job files to PC. Then they should use JobEditor software to edit file with automatic syntax check.

In the Edit window job content and also job header can edited without limitations. To store modificated job on robot controller select *Save* button..

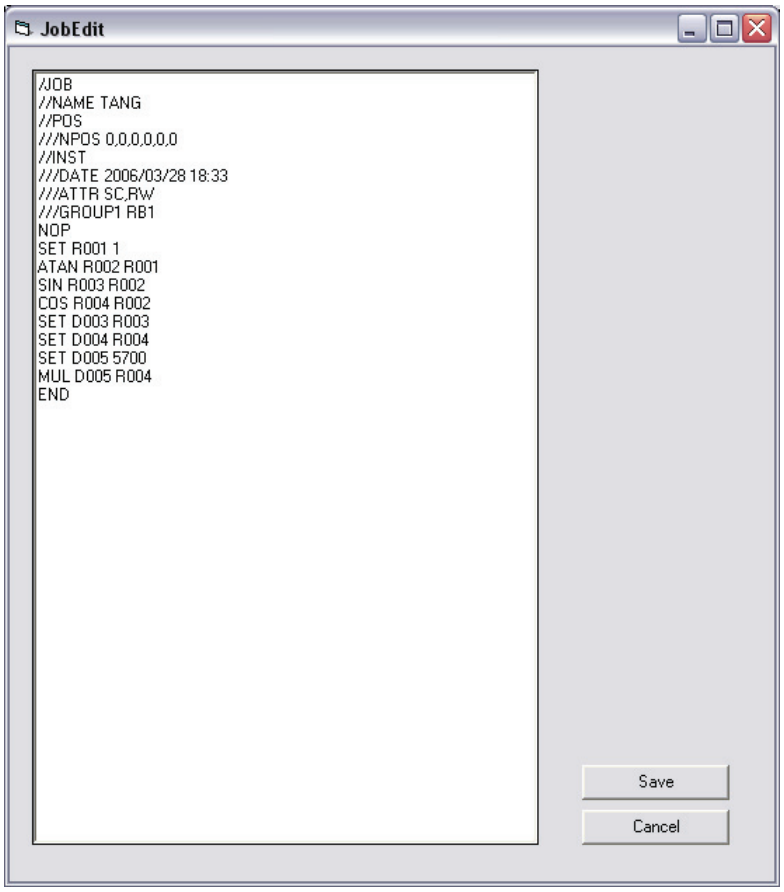

Figure 17 Job Editor window for ascii based editing of jobs

4.14 Job Liste laden

To display a list of jobs stored in the robot controller click on the *Job List* button..

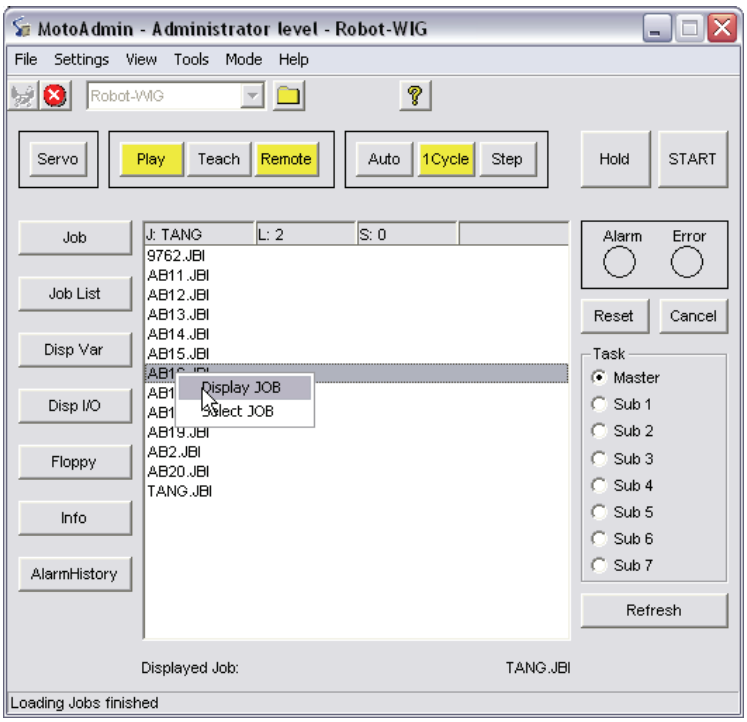

Figure 18 Display Job list

Context menu of job list

Context menu of job list can be used to select a job for execution or to display job content.

4.15 Access variables

Select *Disp Var* to open the variable dialog.

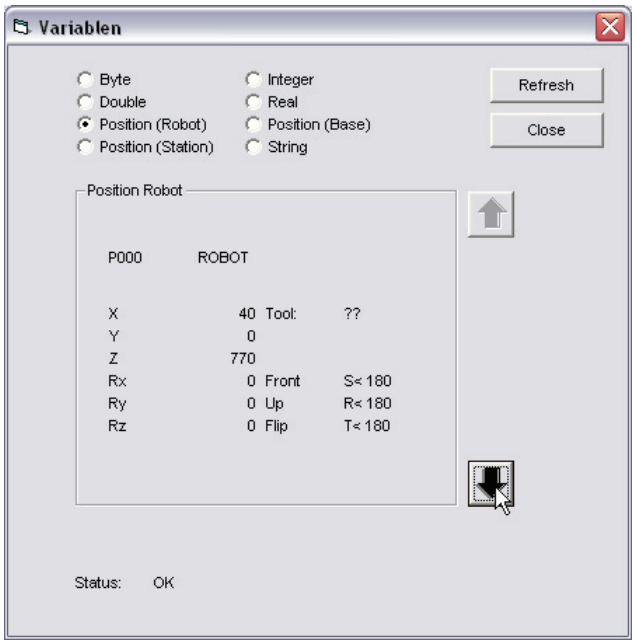

Figure 19 Global variables

In the upper part of the window you can specify the variable type. The following types are available:

- Byte
- Integer
- Real
- Double Integer
- Position variable Robot
- Position variable Base
- Position variable Station
- String

To navigate through the variables use the arrow button or click on variable and insert desired variable number.

You can edit the values of the variables. To do so, click on the value of the variable. An input box appears at the bottom of the window. You can now enter the new value. To stop editing and transmit the new value to the controller press *Enter*. If you want to cancel editing without transmitting the entered value to the robot press *Escape*.

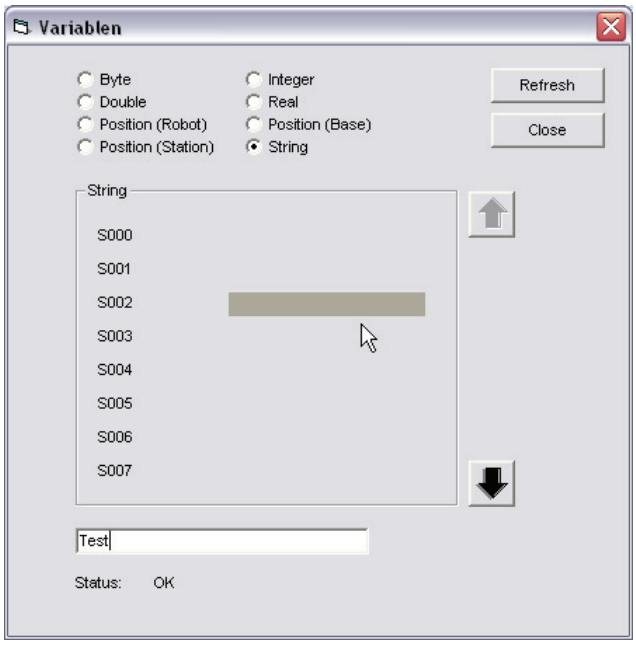

Figure 20 Edit variables

If a position variable is not yet initialized asterisks will appear instead of the values.

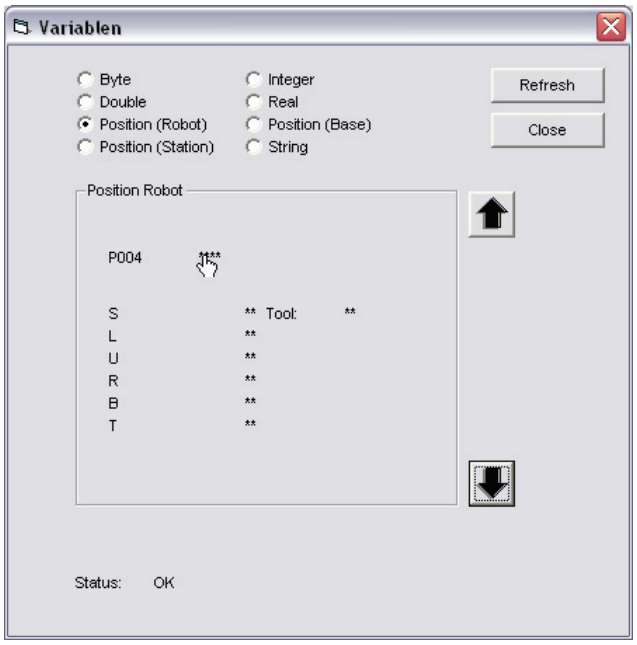

Figure 21 Initialization of position variables

Position variables can be initialized by clicking on the type of the variable (****, Pulse, Robot, Base etc.). If a position variable is reinitialized the old values get lost. The following message appears:

Figure 22 Confirm initialization

In the next step the type of position variable has to be selected.

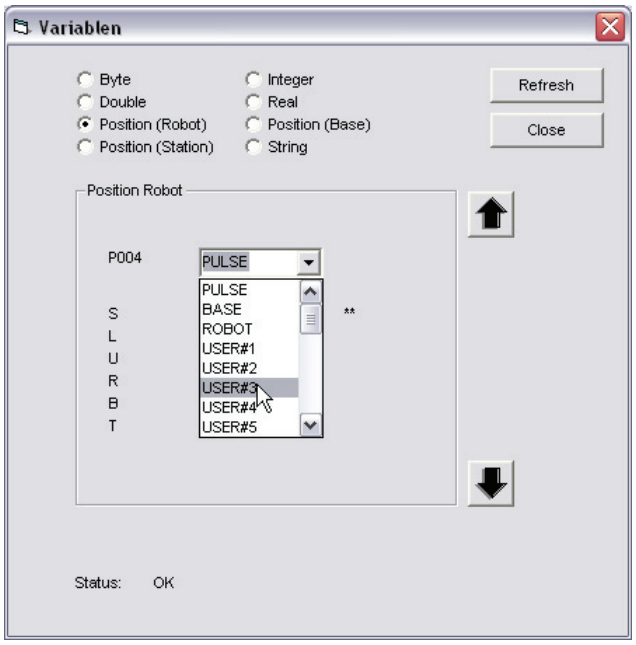

Figure 23 Select type of position variable

The display is static. To update the variable values you have to click on the *Refresh* button.

Press *Close* to return to main window.

4.16 Watch I/O Signals

To display I/O signals select [Disp I/O] from the main window. This opens a new window where you can select the type of I/O signals you want to check. The following signal types are available:

- External Inputs
- External Outputs
- Universal Inputs
- Universal Outputs
- Special Inputs
- Special Outputs
- ·AUX Relais
- ·System Status
- ·Pseudo Input Signald
- ·Network Inputs
- ·Network Outputs

Use the arrow buttons to navigate through the outputs or inputs. All outputs are read-only. You can only write "Network IN" signals. So if there are some other signals you want to set by MotoAdmin, you have to map these signals to "Network IN" signals by changing the ladder program of the controller (see LadderEditor software).

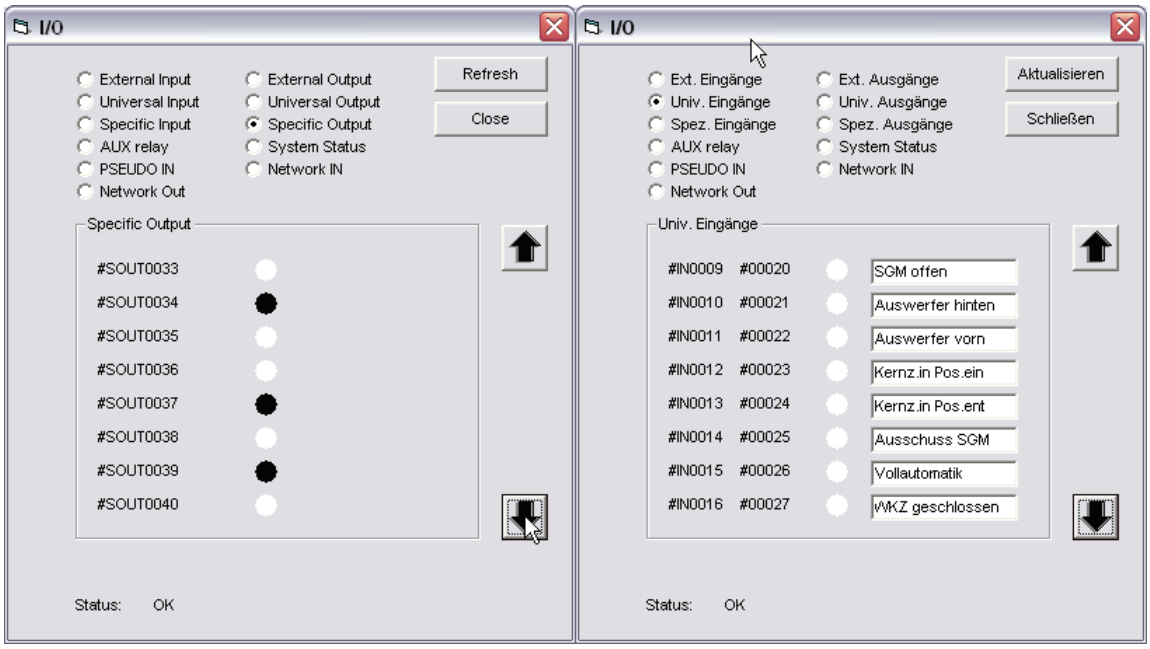

Figure 24 I/O Signals

The display of the I/O signals is static. To update the displayed values you have to click on the *Refresh* button. Select *Close* to return to the main window of the application.

4.17 Saving, Loading and Deleting files

MotoAdmin can transmit jobs and system data from robot to PC and from PC to robot. Saving and loading data is available after selecting the *Floppy* button. Dependent on the current security level the following operations are possible.

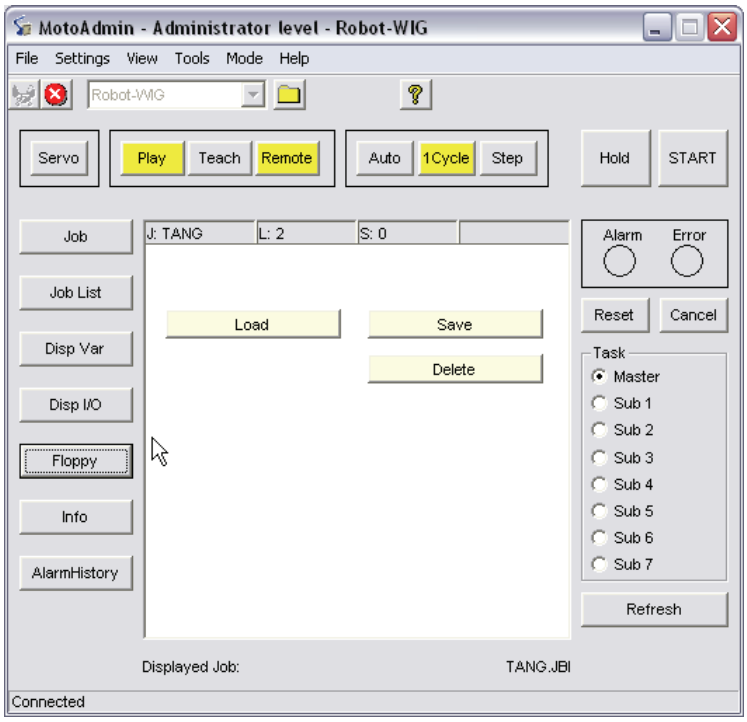

Figure 25 Floppy function

In the first step you have to select the desired operation:

- Save: Transmit data from Robot to PC.
- Load: Transmit data from PC to Robot.
- Delete: Delete data on PC or Robot (only jobs).

Loading data is only accessible in programmer or administrator mode.

In the second step you have to select the data type.

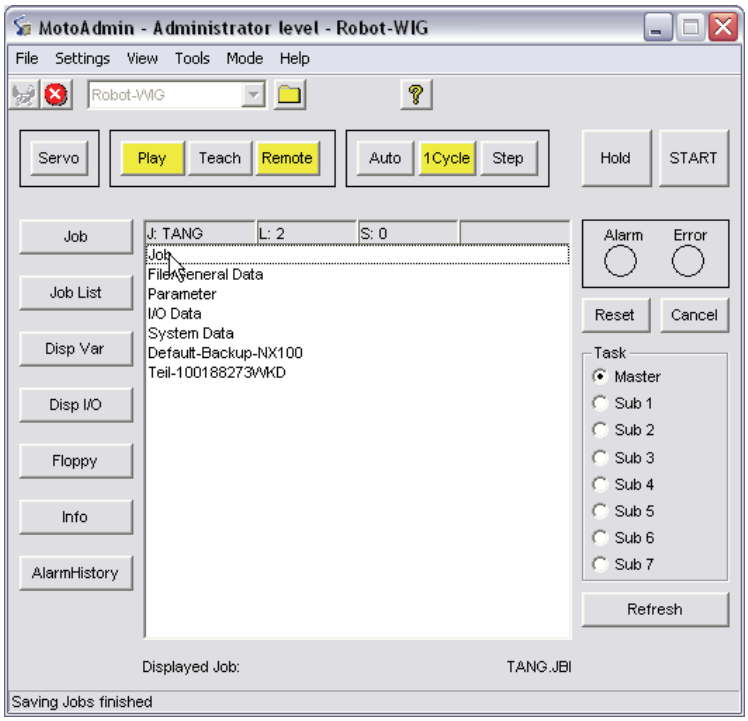

Figure 26 File group

4.17.1 Jobs

If Jobs is selected all available jobs in the robot controller (save) or all available jobs in the working directory of the current robot configuration (load) are displayed.

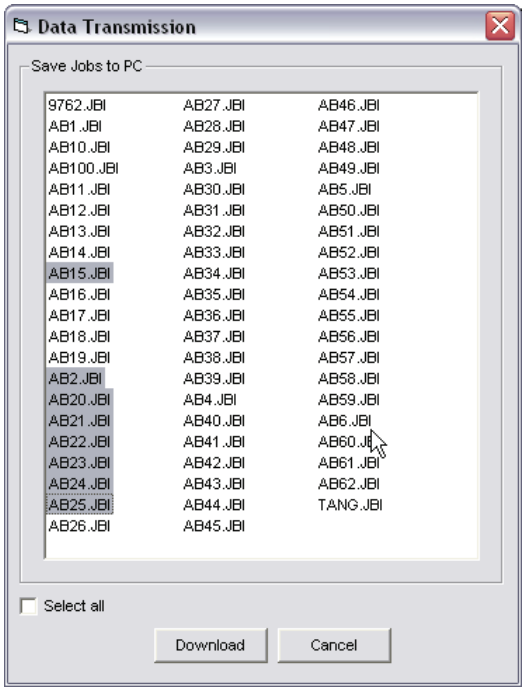

Figure 27 Job selection for saving jobs

You can select the desired jobs by clicking on the job name in the list. Hold the Shift or Ctrl key to select multiple jobs.

4.17.2 System data

To load or save system data like parameter, tool data, condition data etc. you have to select file group first. In the following dialog you can mark the available files. You have to take into account that depending on the Robot controller (software, installed options) there might be files which cannot be loaded or saved.

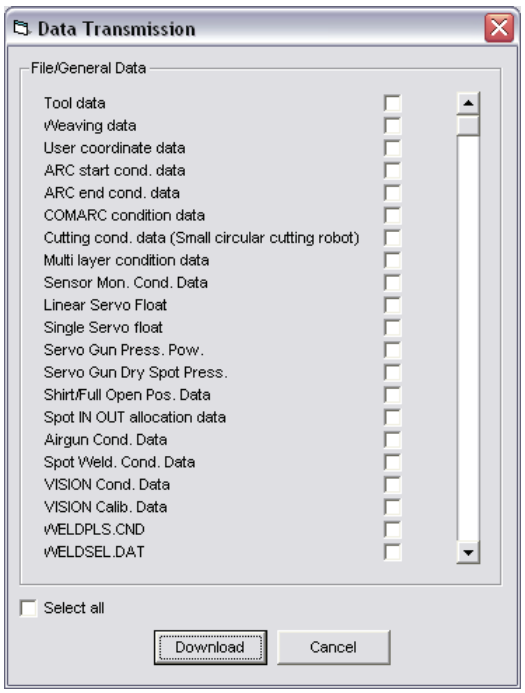

Figure 28 Saving of system data

A window is displayed where you can see if operation was successful or not.

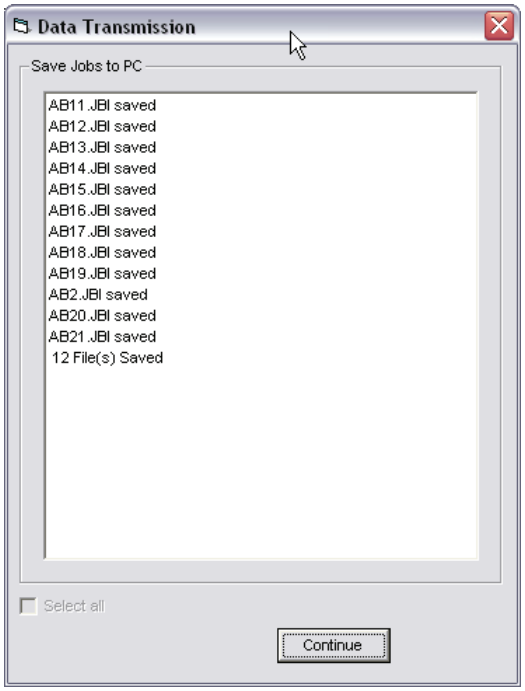

Figure 29 Message window

4.17.3 One-Button Backup

MotoAdmin can also work with backup definition files. These files contain a list of those files, which should be integrated in the backup of the selected robot controller.

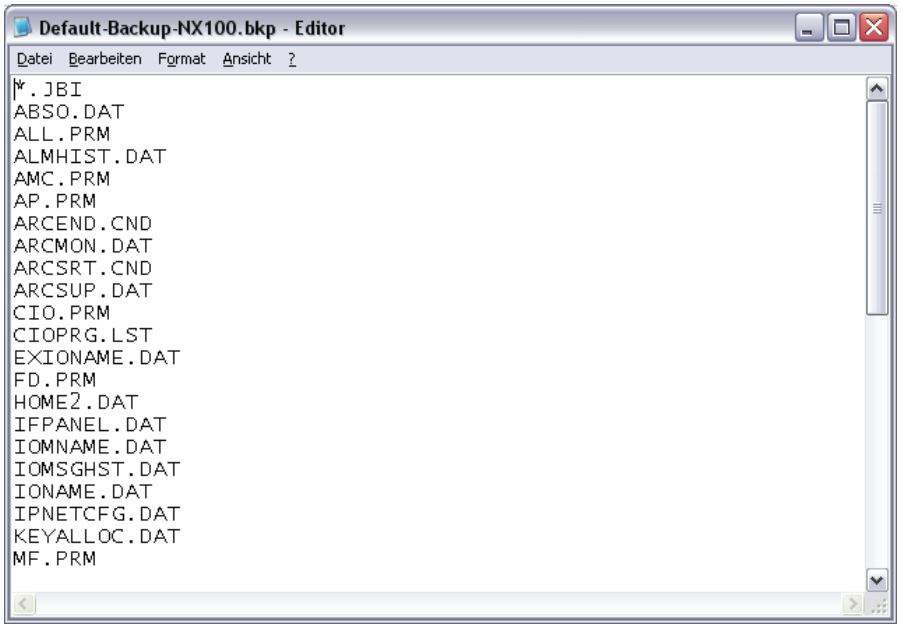

Figure 30 Backup definition files

Beside the full filename also *.JBI can be used as a placeholder for all available jobs on controller. Backup definition files can only be used in case of saving data. For one controller multiple backup definition files can be defined (see Figure 26). The files must be stored in the working directory of the robot controller. The files can be created with an ascii editor and must have *.bkp file extension.. The saved data is stored in subfolders of the working directory. The folder names contain a time and data information in addition to the backup definition file name.

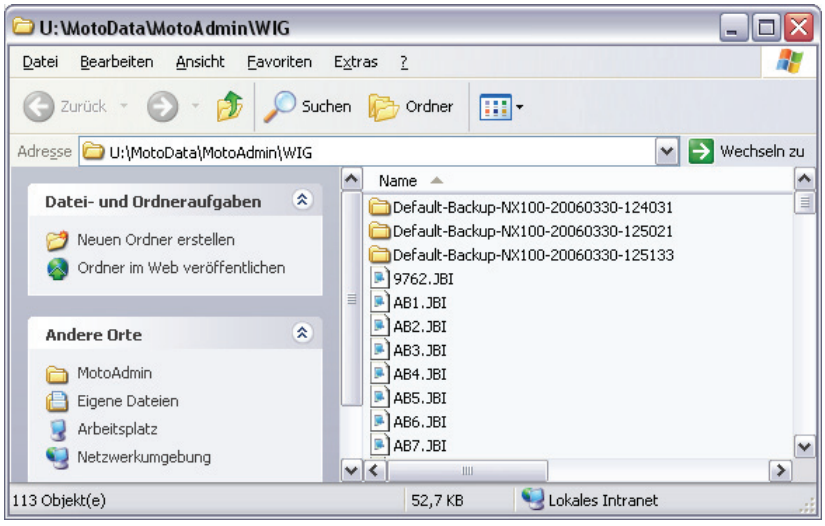

Figure 31 Naming of One-Button-Backup folders

4.17.4 Deleting data

If the Floppy menu item *Delete* is selected, you can choose whether to delete a file on Robot or on PC:

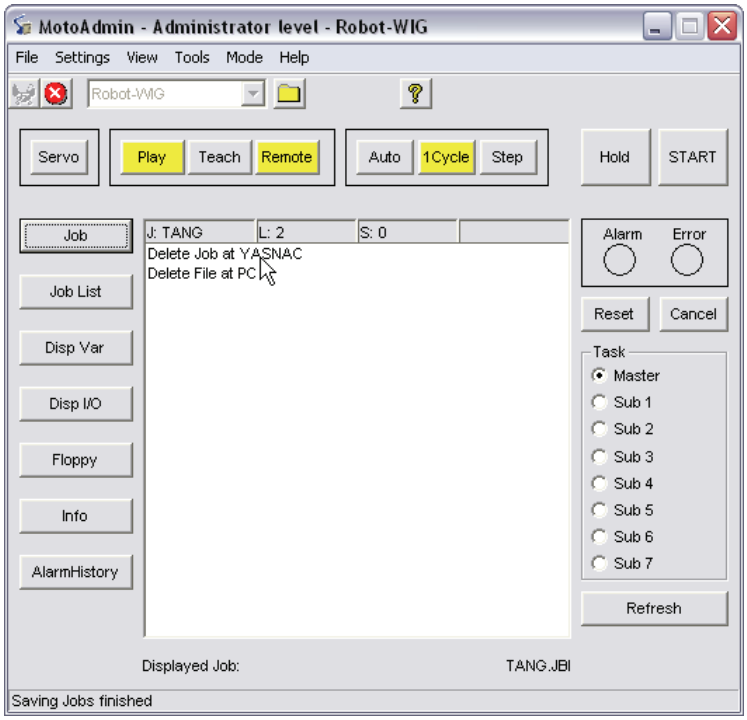

Figure 32 Deleting data

Only jobs can be deleted on Robot side.

4.18 System Information

The System Information dialog is displayed after slecting *Info* button. This dialog contains basic information of selected robot controller.

- Software version,
- Robot type,
- Base axis and external axis,
- Current pulse and cartesian position,
- Installed functions.

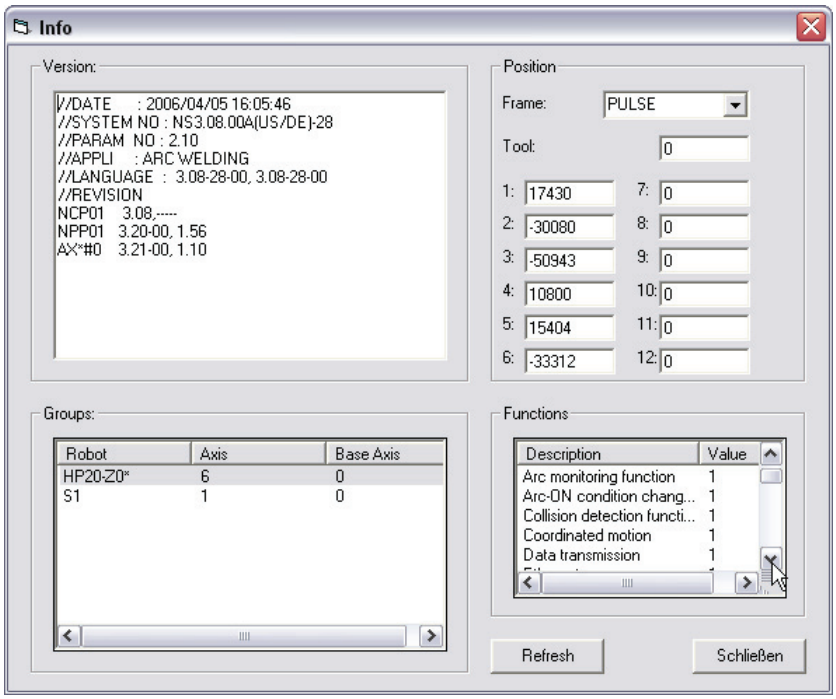

Figure 33 System Information

4.19 Read Alarm History

Alarm History can be accessed by selecting *AlarmHistory* button. The Alarm History is sorted by date/time so that newest item are listed on top.

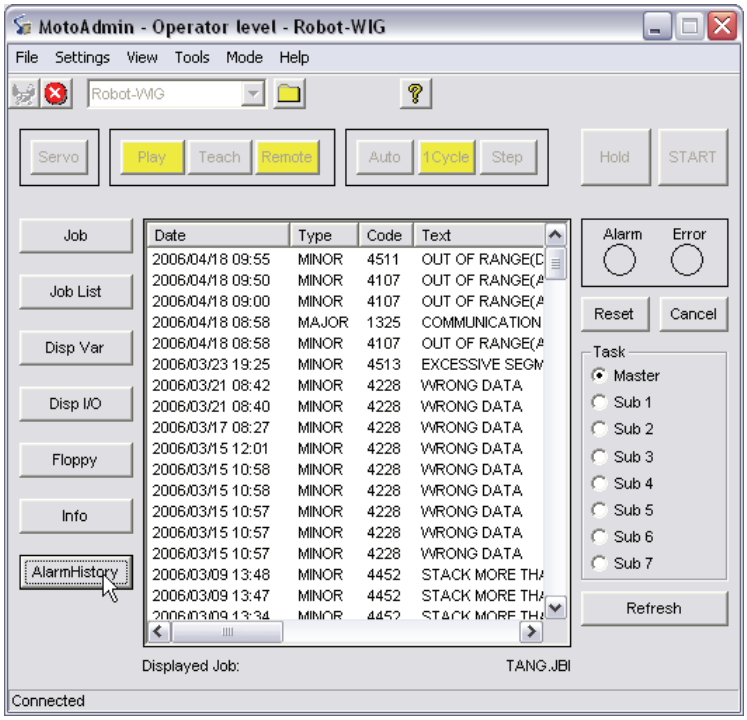

Figure 34 Alarm History

Imprint

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